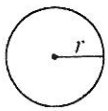
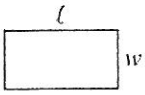
ACT Plane Geometry Problem Set

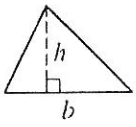
Reference Information



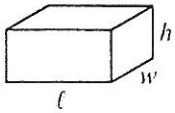
$A = \pi r^2$
$C = 2\pi r$



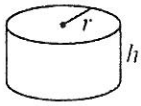
$A = \ell w$



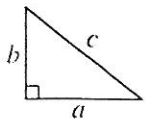
$A = \frac{1}{2}bh$



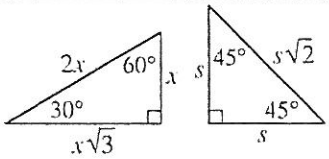
$V = \ell wh$



$V = \pi r^2 h$



$c^2 = a^2 + b^2$



Special Right Triangles

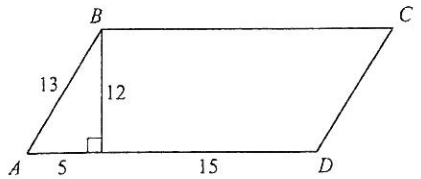
The number of degrees of arc in a circle is 360.
The sum of the measures in degrees of the angles of a triangle is 180.

1. A rectangular lot that measures 125 feet by 185 feet is completely fenced. What is the length, in feet, of the fence?
   F. 310
   G. 435
   H. 620
   J. 740
   K. 1,240

2. The formula for the volume, V, of a sphere with radius r is $V = \left(\frac{4}{3}\right)\pi r^3$. If the radius of a baseball is $1\frac{1}{3}$ inches, what is the volume to the nearest cubic inch?
   A. 6
   B. 8
   C. 10
   D. 14
   E. 15

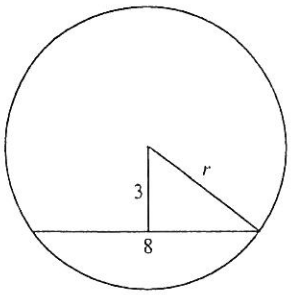
3. If a rectangle measures 20 meters by 48 meters, what is the length, in meters, of the diagonal of the rectangle?
   F. 52
   G. 68
   H. 72
   J. 112
   K. 2,704

4. Parallelogram $ABCD$, with dimensions in inches, is shown in the diagram below. What is the area of the parallelogram, in square inches?



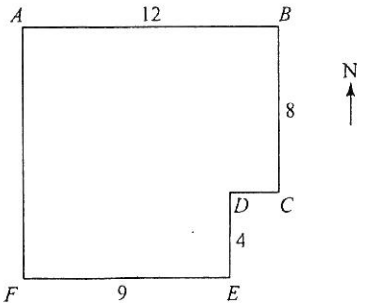
   A. 60
   B. 72
   C. 180
   D. 240
   E. 260

5. A chord 8 inches long is 3 inches from the center of a circle, as shown below. What is the radius of the circle, to the nearest tenth of an inch?



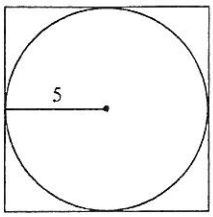
   A. 4.0
   B. 4.3
   C. 5.0
   D. 6.9
   E. 8.5

6. A park has the shape and dimensions, in miles, given below. The park office is located halfway between point A and point D. Which of the following is the location of the park office from point A? (Note: The park's borders run east–west or north–south.)



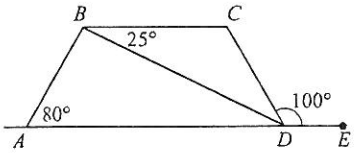
   A. 3 miles east and $4\frac{1}{2}$ miles north
   B. $4\frac{1}{2}$ miles east and 4 miles south
   C. 4 miles east and $4\frac{1}{2}$ miles south
   D. 6 miles east and 4 miles south
   E. 6 miles east and $4\frac{1}{3}$ miles south

7. A square is circumscribed about a circle of a 5-foot radius, as shown below. What is the area of the square, in square feet?



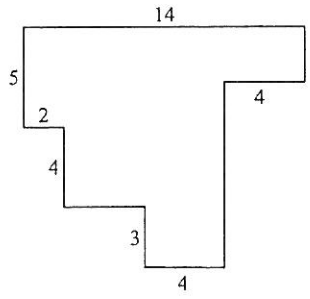
F. 144
G. 100
H. 25π
J. 50
K. 25

8. In the figure below, $ABCD$ is a trapezoid. E lies on line AD, and angle measures are as marked. What is the measure of angle CDB?



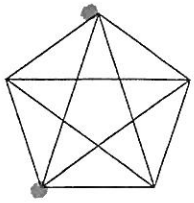
F. 25°
G. 30°
H. 55°
J. 80°
K. 100°

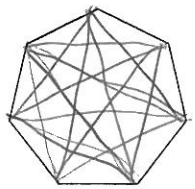
10. In the figure shown below, each pair of intersecting line segments meets at a right angle, and all the lengths are given in inches. What is the perimeter, in inches, of the figure?



A. 30
B. 36
C. 42
D. 52
E. 62

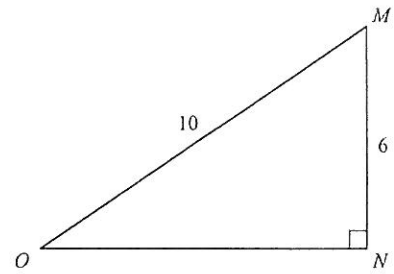
11. Pentagons have 5 diagonals, as illustrated below. How many diagonals does the heptagon (7 sides) below have?


Pentagon


Heptagon

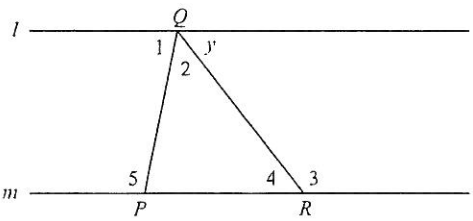
F. 7
G. 12
H. 14
J. 21
K. 28

12. Given right triangle $\triangle MNO$ below, how many units long is $\overline{NO}$?



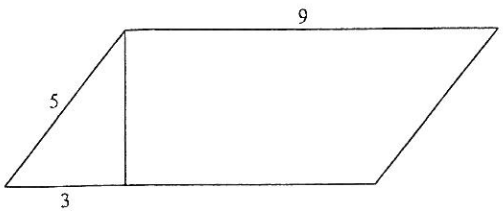
F. $2\sqrt{2}$
G. 4
H. 6
J. $\sqrt{60}$
K. 8

13. In the figure showing $\triangle PQR$ below, line l is parallel to line m. Which one of the following angles must be congruent to $\angle y$?



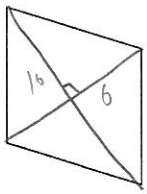
F. $\angle 1$
G. $\angle 2$
H. $\angle 3$
J. $\angle 4$
K. $\angle 5$

14. The area of a parallelogram may be found by multiplying the base by the height. What is the area, in square inches, of the parallelogram below?



A. 27
B. 36
C. 45
D. 48
E. 81

15. All sides of a rhombus are the same length, as shown below.



If one diagonal is 12 inches long and the other is 32 inches long, how many inches long, to the nearest hundredth of an inch, is a side of the rhombus?
A. 8.54
B. 17.09
C. 34.17
D. 35.78
E. 48.00

16. A rectangular parking lot that is 3 feet longer than it is wide has an area of 550 square feet. How many feet long is the parking lot?
F. 19
G. 20
H. 22
J. 25
K. 28

17. In order to clean her aquarium, Stephanie must remove half of the water. The aquarium measures 30 inches long, 16 inches wide, and 12 inches deep. The aquarium is currently completely full. What volume of water, in cubic inches, must Stephanie remove?
A. 1,440
B. 2,880
C. 4,320
D. 5,760
E. 7,200

18. A square pool with an area of 81 square feet is to be placed entirely within a circular enclosure with a radius of 10 feet. Tiles will be laid within the entire enclosure around the pool (but not under it). What is the approximate area, in square feet, of the enclosure that will be tiled?
F. 81
G. 233
H. 315
J. 396
K. Cannot be determined without knowing the exact placement of the pool.

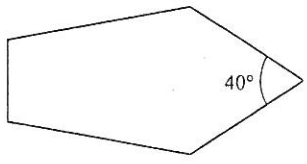
19. For the area of a square to triple, the new side lengths must be the length of the old sides multiplied by:
A. $\sqrt{3}$
B. 3
C. 4
D. $2\sqrt{3}$
E. 9

20. The volume of a cube is given by the formula s^3, where s is the length of a side. If a cube has a volume of 64, and the length of each side is halved, the new cube's volume will be:
F. 3
G. 6
H. 8
J. 16
K. 32

21. The measure of the vertex angle of an isosceles triangle is $(a + 30)°$. The base angles each measure $(2a - 15)°$. What is the measure in degrees of one of the base angles?
A. 36°
B. 45°
C. 57°
D. 66°
E. 90°

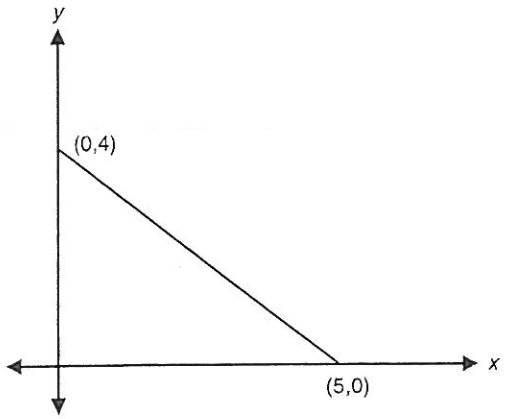
22. If the volume of a cube is 64, what is the shortest distance from the center of the cube to the base of the cube?
A. 2
B. 4
C. $2\sqrt{4}$
D. $\sqrt{32}$
E. 16

23. In the pentagon, shown below, one interior angle measures 40°. What is the total measure of the other 4 interior angles?



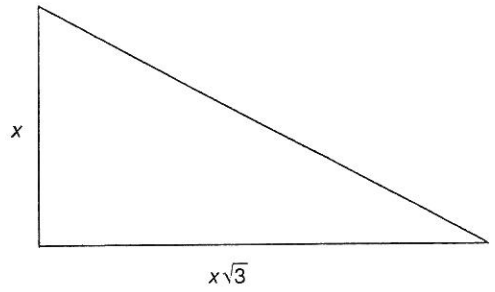
A. 120°
B. 160°
C. 320°
D. 500°
E. 680°

24. What is the area, in coordinate units, of the triangle in the figure below?



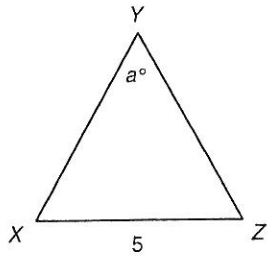
A. 4.5
B. 9.0
C. 10.0
D. 12.5
E. 20.0

25. In the figure below, the perimeter of the triangle is $12+4\sqrt{3}$ inches. What is the value of x, in inches?



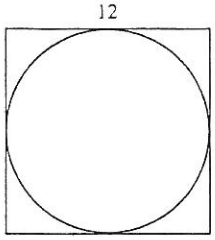
A. 2
B. 4
C. 6
D. 8
E. 12

26. In the figure below, $\overline{XY} = \overline{YZ}$. If $a = 40°$, than $\overline{XY}$ =?



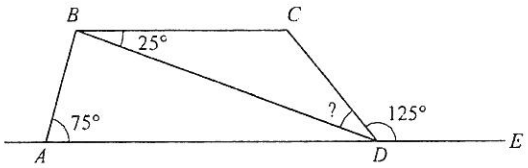
F. 9.50
G. 8.75
H. 7.75
J. 6.25
K. 5.50

27. A circle is circumscribed within a square with sides of 12 feet, as shown below. What is the area of the circle, to the nearest square foot?



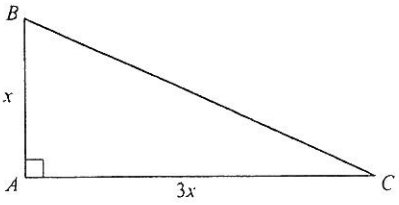
F. 144
G. 113
H. 72
J. 12π
K. 3π

28. In the figure below, $ABCD$ is a trapezoid. Point E lies on line AD, and angle measures are as marked. What is the measure of angle BDC?



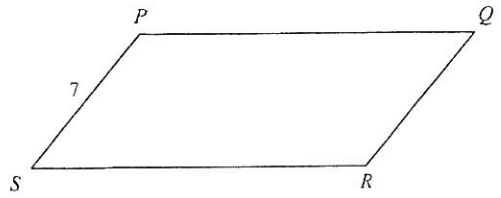
F. 25°
G. 30°
H. 45°
J. 55°
K. 100°

29. In the figure below, ΔABC is a right triangle with legs that measure x and $3x$ inches, respectively. What is the length, in inches, of the hypotenuse?



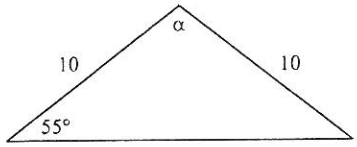
F. $\sqrt{10}x$
G. $\sqrt{3}x$
H. $\sqrt{2}x$
J. $2x$
K. $4x$

30. In the parallelogram $PQRS$ shown below, PS is 7 centimeters long. If the parallelogram's perimeter is 40 centimeters, how many centimeters long is PQ?



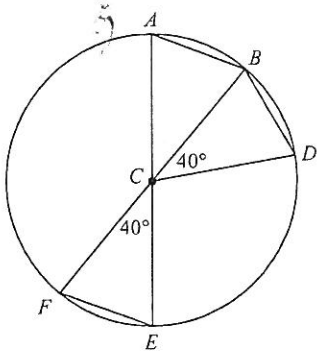
F. 49
G. 21
H. 13
J. 10
K. 5.7

31. In the figure below, what is the measure of $\angle\alpha$?



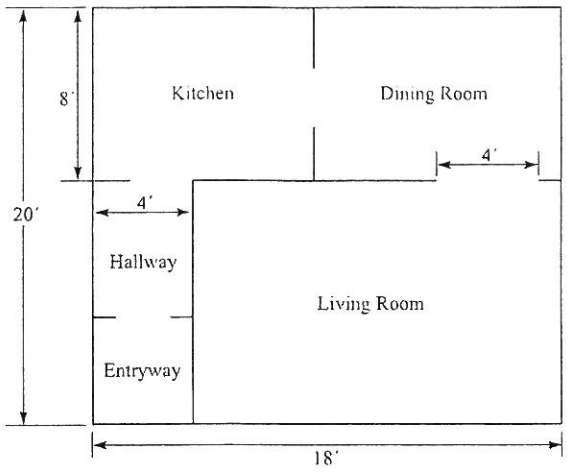
F. 20°
G. 55°
H. 70°
J. 75°
K. 110°

32. In the circle shown below, C is the center and lies on segments $\overline{AE}$ and $\overline{BF}$. Which of the following statements is NOT true?



F. $\angle BAC$ measures 70°
G. $\overline{AB}$ is parallel to $\overline{EF}$
H. $\overline{AB} \cong \overline{BD}$
J. $\angle BCE \cong \angle DCF$
K. $\overline{CF} \cong \overline{EF}$

Use the following information to answer Questions 33 and 34.



The figure above shows the plan for the ground floor of a townhouse. The thickness of the walls should be ignored when answering the questions. The dimensions shown are in feet, and each region is rectangular.

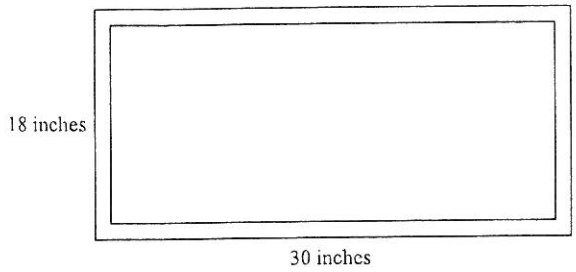
33. What is the area, in square feet, of the living room?
A. 360
B. 280
C. 216
D. 168
E. 120

34. What is the perimeter, in feet, of the ground floor of the townhouse?
F. 76
G. 80
H. 92
J. 180
K. 360

35. A certain rectangle is 5 times as long as it is wide. Suppose the length and width are both tripled. The perimeter of the second rectangle is how many times as large as the perimeter of the first rectangle?
A. 3
B. 5
C. 6
D. 12
E. 15

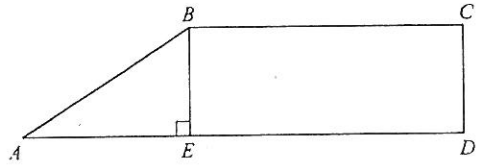
36. The perimeter of a square is 36 units. How many units long is the diagonal of the square?
F. 8
G. $9\sqrt{2}$
H. 16
J. 18
K. $18\sqrt{3}$

37. The picture shown below has a uniform frame-width of $\frac{5}{8}$ inches. What is the approximate area, in square inches, of the viewable portion of the picture?



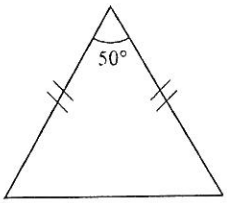
A. 426.25
B. 481.56
C. 510.40
D. 510.75
E. 540.00

38. In the figure shown below, $AD = 16$, $ED = 11$, and AE is congruent to CD. What is the length of AB?



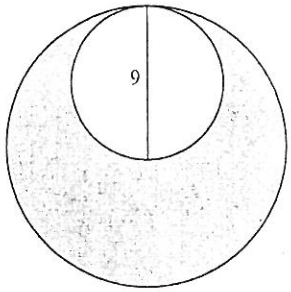
F. 5
G. $5\sqrt{2}$
H. 6
J. $11\sqrt{2}$
K. 25

39. The isosceles triangle below has one angle measure as shown. What is the measure of each of the other angles?



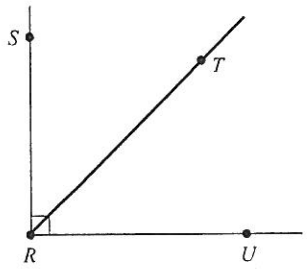
F. 30°
G. 45°
H. 50°
J. 65°
K. 130°

40. The figure below shows 2 tangent circles such that the 9-inch diameter of the smaller circle is equal to the radius of the larger circle. What is the approximate area, in square inches, of the shaded region?



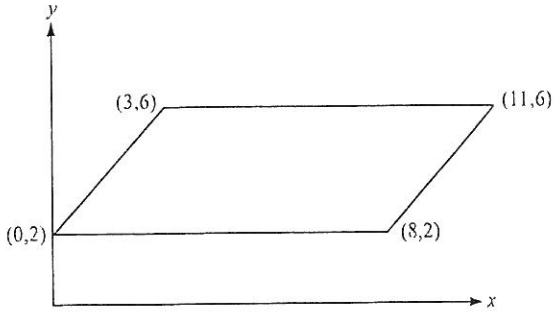
A. 28.27
B. 56.55
C. 63.62
D. 190.74
E. 254.47

41. In the figure shown below, the measure of $\angle SRT$ is $(x + 15)°$ and the measure of $\angle SRU$ is 90°. What is the measure of $\angle TRU$?



F. $(105 + x)°$
G. $(105 - x)°$
H. $(75 + x)°$
J. $(75 - x)°$
K. $(x - 75)°$

42. In the standard (x, y) coordinate plane below, the points (0,2), (8,2), (3,6), and (11,6) are the vertices of a parallelogram. What is the area, in square units, of the parallelogram?



F. $6\sqrt{2}$
G. 16
H. 32
J. 56
K. 88